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ART. VII.—*The Philosophy of Natural History, by William Smellie, Member of the Antiquarian and Royal Societies of Edinburgh; with an Introduction and various Additions and Alterations intended to adapt it to the present State of Knowledge.* By JOHN WARE, M. D. Fellow of the Massachusetts Medical Society, and of the American Academy of Arts and Sciences. 8vo. pp. 336. Boston. Cummings, Hilliard, and Co. 1824.

FEW departments of knowledge are more interesting than Natural History, and the attention which is now given to it furnishes the best evidence, that its claims to notice begin to be fully estimated. The inducements to its cultivation are peculiarly strong in our own country, whose immense lakes, forests, and mountains, have as yet been but imperfectly explored by Naturalists, and the little that is known of their productions leads to the belief, that they contain abundance to encourage and reward the labors of science.

It has been among the reproaches cast upon us, that we are compelled to look into the works of foreigners for the Natural History of our country, and though this is no longer true with regard to the vegetable kingdom, yet even in this, as well as in the others, the harvest is still abundant and the laborers but few. A taste for this science cannot be too early formed; for Natural History is a study peculiarly well adapted to the young, from the great interest which it excites, from the exercise it gives the intellectual faculties, and from the sources of pure and innocent enjoyment, which it cannot fail to open; and we know of no work better calculated for an elementary one, than the Philosophy of Natural History by Smellie. It has long been regarded with favor for the excellence of its plan, and the general accuracy of its details. It gives a cursory view of the structure, functions, habits, and peculiarities of animals, the distinction between them and vegetables, beginning with man and descending to the lowest and most imperfect of the animal creation, and it abounds throughout with profound and philosophic views of the subject. In this way the minute details of the science are avoided, and the young beginner is not compelled, at the outset of his career, to burden his memory with a copious and unintelligible nomenclature.

To a certain extent this arrangement is highly judicious, but it is no doubt proper that the student should as early as possible become acquainted with the general outlines of the classification, and the principles on which it is founded, otherwise much of the science will appear to him obscure and confused. The want of this general classification was unquestionably a very great defect in the original work of Smellie, and there is another, of a different character however, arising from the great advances that have been made in science since the time of its publication, a period during which probably greater progress has been made in Natural History than in any other equal portion of time. In presenting therefore a new edition to the public, it was desirable to adapt the work to the present state of knowledge; to incorporate into it all the improvements and discoveries that had been subsequently made; to reject all that portion which later researches had shown to be erroneous; and thus remove the greatest objection to its general use as an elementary book of instruction. This task has been performed by Dr Ware; he has retained as much of the original as the advanced state of science would allow; he has judiciously altered, as far as practicable, what was obsolete, and where that was not possible he has given new matter in the place of the original. The two first chapters of Smellie are entirely omitted, and instead of them we are presented with a sensible, clear, and well written introduction divided into three chapters, the first of which treats of the nature of living bodies, and the distinction between animals and vegetables, and the second and third of the structure of vegetables and animals.

All the productions of nature may be divided into two great classes, namely, those that possess life, and those that do not; the former includes animals and vegetables, the latter minerals alone. The first class differs from the second in its origin; every individual belonging to it being the production of a preceding one, and being endowed with the power of contributing in some way to the continuance of its species. This distinction is very striking and important. Nothing analogous exists in minerals; it is by no means however the only distinctive character, though perhaps the most remarkable one. Animate bodies differ also from inanimate ones in requiring something extraneous to contribute to their nourishment and growth; minerals enlarge by the juxtaposition of particles only.

Vitality, moreover, enables animals and vegetables to resist to a certain degree the influence of physical laws. This is very remarkable in individuals of the higher classes of the animal kingdom, which are able to retain their own temperature in every state of atmosphere, and in every change of season and climate.

> ‘Individuals have exposed themselves voluntarily to the air of ovens, at temperatures from two hundred and sixty degrees to three hundred and fifteen degrees of Fahrenheit's thermometer, without any very great inconvenience, while water was boiling and meat baking in the same atmosphere. Very lately the whole of two ships' crews wintered in about seventyfive degrees of north latitude in perfect safety, where the temperature of the air was, for many weeks together, almost constantly below—30°, and where they became so accustomed to severe cold, that the atmosphere, when at zero, felt mild and comfortable. These facts show a power of resisting the operation of external causes, which is possessed by no substances except such as are endowed with life, and is, probably, possessed in some degree by all that are. For, although vegetables and the lower orders of animals are not capable of resisting to the same extent the influence of heat and cold, yet they all show in some measure the existence of the same power.’ p. 4.

Animate bodies have this farther distinction, ‘that they all terminate their existence in death.’ When the vital principle has departed, the materials which entered into their composition obey physical laws, and undergo changes and decomposition. Some parts, as the teeth and bones of animals, and the trunks and branches of trees, resist for a time, but all finally submit to the inevitable law of creation, that dust must return to dust. The line of demarkation is not so evident between animals and vegetables, and most naturalists have failed in their attempts to point it out. Locomotion has been supposed by many to be a distinctive characteristic of the animal creation, but this is possessed by some marine plants, and is denied to the oyster and many other species of animals. A certain degree of motion is enjoyed by nearly the whole of the vegetable kingdom. The roots of most plants will change their direction in pursuit of water, the tendrils of some will attach themselves to objects that approximate without touching them, the leaves of all will turn to the light, and some, like those of the Heliotrope, and even the common sunflower, perform nearly a diurnal revolution. 'Vegetables,' says Linnæus, 'grow and *live;* animals grow, live, and *feel.*' But what proof is there, that the sensibility of some plants, that of the sensitive, for example, is not as great as that of the corals, madrepores, and zoophytes generally? The plant certainly gives more indication of sensation than the animals referred to, and we know of no reason to induce us to believe, that they are actually endowed with any greater degree of sensibility. It has been well remarked by Smellie, that 'life, without some degree of sensation, is an incomprehensible idea.'

Real distinctions, however, between animals and vegetables do exist, and must be sought in their intimate structure and composition, in the nature of their food, in the manner of taking and the mode of digesting it. Animal substances contain all the elementary principles of which vegetables are composed, and azote or nitrogen is always found in them in addition. From this circumstance the odor emitted during combustion has been named as a test, by which the presence of animal or vegetable matter could be determined, and some stress is laid on it by Dr Ware. It is observed, however, by Mr Murray, in his System of Chemistry, that 'of all the products of the vegetable system, the juice of the *Carica Papaya* is the one which approaches most nearly to animal matter, and it might indeed be regarded as a variety of it, if its origin were not known.' The glutinous part of wheat, *caoutchouc*, or Indian rubber, and some other vegetable products give out, when burning, an odor very analogous to that from animal matter, under the same circumstances. It is doubtful, therefore, whether this can be regarded as affording a distinctive character between the productions of the two kingdoms, and we shall no doubt be disappointed if we expect to find any one circumstance, by which vegetables and animals may be distinguished from each other. Dr Ware very judiciously remarks, that

> 'The distinction must be sought in the general structure, the general mode of existence, and the purposes of existence in the two. And in a few words we may say, that animals differ from plants in being furnished with internal organs for the purpose of digesting food, instead of absorbing it by roots from the earth; in being furnished with organs, which render them capable of moving

from place to place, or at least of moving one part of their bodies in some other part; in having powers of sensation, perception, and volition, by which they acquire a knowledge of the existence and qualities of other bodies besides themselves, and form some sort of relation or connexion with them; and in being obviously intended, by the possession of those organs and powers, to be conscious of and to enjoy existence.'

Of the various classifications of the animal kingdom, that of Linnæus is probably the best known, and was for a time universally adopted.* The greatest objection to it arises from the facts, that it brings together, in some instances, animals of very dissimilar properties and habits, that it does not sufficiently regard the various characters of the different objects of animal nature arising from difference of structure, and that it disregards, in fine, too much the study of comparative anatomy, on which every distribution of animals should be founded.

The division proposed by Lamarck, a profound French naturalist, is hardly known in this country, and is not well calculated to answer the objects for which a classification should be formed.

A new and improved arrangement has been adopted within a few years, and seems likely to supersede all others. We are indebted for this to the greater attention, which is now bestowed on comparative anatomy, and without a thorough knowledge of which zoology cannot be advantageously studied. The classification to which we allude, and which is far more perfect than any that preceded it, though that of Linnæus may be considered as having furnished the basis of it, is contained in the new work of Cuvier, entitled 'Le Règne Animal,' and we are glad to perceive that Dr Ware has given the general outlines of it in the present edition of Smellie.

Many philosophers and naturalists have appeared willing at different times to degrade man by classing him with several animals of a lower order; and even Linnæus himself ranked him with bats, monkeys, and lemurs, merely because the number and arrangement of their incisor or cutting teeth in each jaw were similar to his. A thorough knowledge of comparative anatomy, however, has taught naturalists of the present day, that every classification, in order to be useful, must rest 'on the double basis of external and internal structure,' and that one or two unimportant coincidences are not a sufficient reason for placing animals, which differ in many essential particulars, in the same class or order. Comparative anatomy also teaches us, in spite of the speculations of some philosophers, that man differs essentially from all other animals in his physical, as well as in his intellectual faculties, that he is the only animal that naturally walks erect, and that, though some may surpass him in the delicacy of some one organ, as those of some of the senses, for example, yet on the whole the combination of his bodily powers is so wonderful, and capable of such astonishing effects, as to entitle him to the most elevated rank in the scale of living beings.

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* He divided animals into six classes, viz. Mammalia, Aves, Amphibia, Pisces, Insecta, and Vermes.

A minute examination of the structure, both internal and external, of apes, baboons, and monkeys, has satisfied naturalists, that they are separated by an immense interval from the most inferior variety of the human race, and the necessity therefore became obvious of adopting some classification, founded upon permanent and important characters, which should place man in the rank to which he was entitled from his great physical and moral superiority. All animals are, therefore, divided by Cuvier in the first place into two grand divisions, viz. into *vertebral*, embracing those that have a spine or *vertebræ*, and into *invertebral*, comprehending all those that are destitute of it. These are subdivided into the following classes.

I. VERTEBRAL ANIMALS.

1. *Mammalia*, or those which suckle their young.
2. *Birds.*
3. *Reptiles*, as frogs and serpents.
4. *Fishes.*

The two first of the above classes are warm blooded, and the two last cold blooded.

II. INVERTEBRAL ANIMALS.

5. *Insects.*
6. *Crustacea*, as the lobster and crab.
7. *Mollusca*, as the oyster and cuttle fish.

8. *Vermes*, or worms, as the leech and earth worm.
9. *Zoophytes*, as the star fish, sponges, corals and madrepores.

Each of these classes is subdivided into several orders, these into genera, and these last into species. As it is foreign to our purpose to give a complete view of the classification of animals, we shall confine our notice of it to the first class, which is, perhaps, the most interesting, and the subdivisions of which are different in many respects in the arrangement of Cuvier from that of Linnæus.*

The Mammalia are divided into the following orders; First, *Bimana*, or the two handed animals. Man is the only example of this order. Second, *Quadrumana*, or four handed animals, embracing apes, baboons and monkeys, all of which have hands, though imperfect ones in comparison with those of man, on all four extremities. Third, *Carnivora*, or carnivorous animals. This order comprehends four varieties. The first includes bats; the second the hedgehog and mole; the third the bear, polecat, wolf, dog, lion, tiger, &c; and the fourth the seal and some other amphibious animals. Fourth, *Rodentia*, or gnawers; the squirrel, rabbit, beaver, and jerboa, are examples of this order. Fifth, *Edentata*, or animals that are destitute of teeth, or provided only with the canine and grinding ones. In this order are placed the sloth, armadillo, and ant eaters. Sixth, *Ruminantia*, or ruminating animals. This is a very extensive and well marked order, having several important characters, but being distinguished especially by the one that gives it its name, that of bringing up the food, for the purpose of mastication, after it has been swallowed. The camel, dromedary, ox, sheep, &c, belong to this order. Seventh, *Pachydermata*, animals which possess, as the name implies, hard and tough skins. This order embraces all those animals with hoofs, which do not ruminate. To it belong the elephant, mammoth, taper, rhinoceros, horse, hog, &c. Eighth, *Cetacea*, or the whale tribe, which are often, though improperly, ranked with fishes, from which they differ in being warm blooded, breathing by means of lungs instead of gills, bringing forth their young alive and nourishing them with their milk.

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* Linnæus divided the Mammalia into the following orders. First, Primates. Second, Bruta. Third, Feræ. Fourth, Glives. Fifth, Pecora. Sixth, Belluæ. Seventh, Cete. The distinctive characters of these orders, with the exception of the last, depended on the kind, position, or number of the teeth, and thus animals of very different habits were brought together, from a resemblance in one comparatively unimportant particular.

To these orders it has sometimes been proposed to add a ninth, and this arrangement is adopted by Dr Ware for the purpose of embracing certain animals, which are furnished with a pouch *(marsupium)* into which the young are received long after birth, on the approach of danger. From this singular apparatus, they have received the name of Marsupial animals, and though this character is a very remarkable one, it has not been thought sufficiently important by Cuvier to entitle them to rank as a distinct order, and he has accordingly distributed them among the other orders of the Mammalia, to which they have the greatest resemblance. Thus the Ornithorynchus is placed among the Edentata, the Kanguroo with the Rodentia, and the Opossum with the Carnivora. The Ornithorynchus in fact appears to us to be hardly entitled to a place among the Marsupial animals, as it is destitute of a pouch, the very circumstance from which they derive their name, though it possesses the Marsupial bones, and some peculiarities in the structure of other important organs, which Dr Ware considers a sufficient reason for ranking it with that order.

This animal, now generally known by the name of duck billed platypus, is one of the most curious and interesting in natural history, and produced on its first discovery considerable confusion in the Linnæan classification. When first brought to England from New Holland, the only place in which it has been found, it was supposed to be artificial. Numerous specimens have since been obtained, and farther and more minute investigations of its intimate structure have satisfied naturalists, that it is a genuine production of nature. In some respects it has a strong resemblance to a bird, being furnished with a broad, spoon bill, like a duck, and being destitute of teeth, excepting two imperfect ones situated in the lower part of the mouth. No apparatus has been discovered by which it can suckle its young, and the inhabitants of New Holland believe, that it is oviparous, and that it lays two eggs. It is an aquatic animal, with webbed feet, and inhabits the rivers and marshes of New Holland. The body is covered with a thick, soft fur like that of a beaver, and the animal has no inconsiderable resemblance to a small otter. It has four legs and a flat tail, covered with fur like the body. Its greatest length from the tip of the beak to the extremity of the tail is thirteen inches. The only specimen of this singular animal of which we have any knowledge in this country, is in Peale's Museum in Philadelphia. The first specimens sent to Europe were brought to London and described by Dr Shaw, who gave the animal the name of Platypus Anatinus, from the shape of its feet and its resemblance to a duck. It is now, however, known by the name of Ornithorynchus Paradoxus; and it is certainly a much greater paradox in the animal kingdom, than anything hitherto known. Still the singular combination of parts in this animal, strange as it is, tends not at all to render probable the existence of such a creature as a mermaid, under which denomination, some miserable specimens of human ingenuity and fraud have lately been exhibited in this city and in London.

The various productions of the animal kingdom have an intimate relation with each other, and it is not difficult to trace points of similarity and resemblance, from zoophytes, which seem to be the connecting link between animals and vegetables, up to man, who is preeminently the lord of the creation, distinguished from all others as much by the superiority of his physical powers, as by that of his moral faculties. Among the zoophytes, which are divided into three distinct classes, but very imperfect traces of animal organisation are discoverable. Some of them are destitute both of nervous and circulating systems, some have no digestive apparatus, and derive their nourishment wholly from external absorption, and some have no distinction of sexes. Their division into classes rests on the greater or less simplicity of their structure.

Among the other classes of the invertebral animals, however, a more perfect organisation exists. Insects, though destitute of a heart, have an imperfect kind of circulation of the blood, they are furnished with organs of digestion, and nerves of sensation and sense; and some of the animals belonging to the classes Mollusca, Crustacea, and Vermes have a still more complete and complicated structure, simple however in comparison with that of the vertebral animals.

Fishes, the lowest of the vertebral animals, are furnished with a brain and all the organs of sense; their digestive organs are similar to those of the other animals of their class, their bones however are softer, the heart has but one auricle, and one ventricle, and they breathe by gills or branchiæ instead of lungs. Reptiles are divided into four orders, and a considerable variety is found in their anatomical structure. Many of them have two auricles and but one ventricle to the heart; they have a small brain and but an imperfect nervous system. They breathe by means of lungs, but require a small quantity of air only; hence they will live for some time, when almost entirely deprived of it. The structure of birds, which form the next class, approaches still nearer that of the mammalia. They have a double circulation, one for the whole system, and one for the lungs, and the organs of sense in great perfection, particularly that of sight. Their digestive apparatus is peculiar; being unable, from the want of teeth, to masticate their food, they are furnished with a particular organ to grind it. This structure is not so remarkable in carnivorous birds, as in those that live on vegetables, for animal food requires less attrition for the purposes of digestion than vegetable.

All the animals belonging to the class Mammalia, at the head of which stands man, are more perfect in their organisation; and though differing immensely from each other in their external appearance, have no inconsiderable resemblance in their internal structure. They have all a double heart, composed of two auricles and two ventricles; one carries on the general circulation, and the other the pulmonary or that of the lungs. The digestive organs are varied according to the kind of food upon which the animals subsist; those that feed on vegetables having a more extensive and complicated structure for the purposes of digestion than the carnivorous. The circumstances, which entitle this class to be placed at the head of the animal kingdom, are numerous, and most of them are stated in the following extract from Cuvier's *Règne Animal.* 'Les mammifères doivent être placés à la tête du règne animal, non seulement parce que c'est la classe à laquelle nous appartenons nous mêmes, mais encore parce que c'est celle de toutes qui jouit des facultés les plus multipliées, des sensations les plus délicates, des mouvemens les plus variés, et où l'ensemble de toutes les propriétés parait combiné pour produire une intelligence plus parfaite, plus féconde en ressources, moins esclave de l'instinct et plus susceptible de perfectionnement.'

Every one who examines with attention the various classes of animals, their structure, habits, and peculiarities, must be struck with the perfect adaptation of the bodily powers of all to the situation in which they are placed, to the manner in which they are to live, and the food by which they are to be nourished; and he cannot fail to notice the wonderful manifestations of infinite goodness, as well as of infinite power, that are everywhere displayed in the works of creation. He will perceive, that while some are calculated to live in certain climates, or can subsist during a portion of the year only, that others enjoy a far more extended range, and are wholly independent of the change of seasons; that some, destined to obtain their food by violence, are furnished with weapons of attack and defence, which are denied to those which are not compelled to resort to the same means for subsistence; that while some are fitted to live on one kind of food only, others subsist on that of a different or even an opposite nature; and that man is the only animal who can live without inconvenience in almost every quarter of the globe, and upon almost every kind of food; a proof certainly, that his physical powers are superior to those of the rest of the animal creation.

Our readers may apprehend, that in this long digression, we have lost sight in some measure of the work before us; we can assure them, however, that all the topics we have noticed were suggested by the perusal of the introduction alone, and that we are indebted to it for many of the facts and statements which we have offered. As it would be impossible for us to speak of all the subjects, which are treated in this volume, we think it best to confine what further remarks we have to make almost exclusively to those points, in which our own species is the most interested.

The human race has been divided by Blumenbach into five varieties, to which all the various tribes of men may be ultimately traced. These are first, the Caucasian; second, the Mongolian or Tartar; third, the African, Ethiopian or Negro; fourth, the American; fifth, the Malay.

First. The Caucasian variety is supposed to have originated in the vicinity of that chain of mountains, which are situated between the Caspian and the Black Seas, and among which Mount Caucasus is conspicuous. This variety is distinguished by the fine form of the head and the great beauty of the features. The Georgians and Circassians are among the best specimens of it. It embraces all those nations that are or have been the most distinguished in arts, arms, learning, science and civilisation. To it belonged in ancient times the Egyptians, Greeks and Romans, and it comprehends at the present day the inhabitants of the whole of Western Asia, of the greater part of Europe, and the descendants of Europeans throughout the world. The principal ramifications of this variety may be distinguished, it is said, by the analogy of language.

Second. The Mongolian variety embraces the inhabitants of the eastern part of Asia, of China and Japan, and those of the northern part of Europe, the Calmucs and others. It is distinguished by a low, slanting forehead, high cheek bones, straight, black hair, thin beard, and olive complexion. Among some portion of this variety a considerable degree of civilisation exists, and no small progress has been made in the arts of life; but everything among them is stationary; no improvement has taken place for ages, and they have hardly in any instance availed themselves of the advances, which have been made in science and the arts in other parts of the world.

Third. The African, Ethiopian or Negro variety is remarkable for its black color, curled hair, flat nose, compressed cranium, and large lips. The individuals belonging to it are nearly all in an uncivilised state, and have an apparent inferiority in intellectual capacity. This may be and probably is the result of accidental circumstances.

Fourth. The American variety, which includes all the original inhabitants of America, except the Eskimaux, is distinguished by no very striking characteristic, either of features, complexion, or language, in all of which there is a considerable diversity among the numerous tribes, which inhabit our vast continent. The color of the skin is usually red, the form of the head and the shape of the face resemble that of the Mongolian variety; the lips however are larger, and the nose more prominent. The hair is black, straight, and strong, and the beard is removed, by plucking it out as fast as it appears. Most of the tribes, which belong to this variety, are in a savage or semibarbarous state, and are generally unwilling, when favorable opportunities are presented, to adopt the arts and comforts of civilised life, preferring their own hazardous and precarious modes of subsistence. The Mexicans and Peruvians, however, had made considerable progress in the arts, and seemed to enjoy some of the blessings of civilisation. This variety has some resemblance to the Mongolian; not enough, perhaps, to place them together; but Cuvier doubts whether its character is sufficiently defined and uniform to entitle it to rank as a peculiar race.

Fifth. The Malay variety embraces the natives of Borneo, Java, New Holland, Van Diemen's Land, New Guinea, and the numberless islands of the South Sea. It has no well marked common characters; the various tribes belonging to it differ extremely from each other. Some resemble the African, some the Mongolian, and some the Caucasian variety, and the propriety of ranking under one common denomination, individuals differing in so great a degree, is at least doubtful. Cuvier admits only the three first varieties, leaving it for further observation and research, to determine the claims of the other two.

The whole of this arrangement of Blumenbach must be considered rather as the result of convenience, than of any very obvious necessity, as there is an infinite number of shades of difference among the individuals composing these varieties, and the two extremes of the same variety differ more, perhaps, than some individuals belonging to two different varieties. He considers the Caucasian to be the original stock, which runs into two extremes, the Mongolian on one side, and the Ethiopian on the other; between the Caucasian and Mongolian he places the American, and between the Caucasian and Ethiopian the Malay.

The great diversity in the figure and complexion of the human race early attracted the attention of philosophers, and some doubts were suggested, by those who contented themselves with superficial and limited views of the subject, as to the possibility of such various tribes being the offspring of the same original parents. It was confidently asserted in fact, that the whole of mankind could not have sprung from one pair, and that consequently the account in Scripture must either be incorrect or greatly misunderstood. On the other hand it was maintained, that this diversity was entirely the result of physical causes, which had been operating gradually, but uniformly, since the first dispersion of mankind, till they had produced the striking results that at present exist. It was in this discussion that our countryman, the late Dr Smith of New Jersey, distinguished himself by a very elaborate work, in which he endeavored to prove, that the variety was dependent on climate, and this opinion was maintained by those who thought the truth of the Mosaic account of the creation would be called in question on any other hypothesis. All naturalists of the present day, whatever may be the views they entertain of the authenticity of the Scriptures, believe in the common origin of the human race, and thus far at least corroborate the Mosaic account, by a collateral argument of some importance, inasmuch as the investigation has been pursued without any reference to the Bible. They do not, however, attribute the differences that are observable to the effects of climate, and a few considerations will perhaps satisfy most readers, that this cause would be inadequate to their production.*

The color of the negro, for example, must be the result of an original peculiarity of one variety of the human race. It is well known, that in warm climates those negroes, who are exposed to the violence of the sun in the labors of the field, are not as black as those who live in the house, protected from the heat, and who enjoy a more nutritious diet; a fact which is alone sufficient to show, that the color is the effect of a natural secretion, which is promoted by the health of the subject. It is also well known that the descendants of Africans in cold climates, whose ancestors for several generations have resided in latitudes wholly different from the native one of their variety, retain in perfection all the peculiarities of their race. Mr Lawrence, whose opinions have never been suspected of leaning in favor of the Scriptures, and who has acquired an undue share of notoriety for a supposed attack upon them, has summed up the opinions now entertained on this subject, in the following extract, being the conclusion of a very interesting chapter on the Causes of the Varieties of the Human Species.

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* Those who wish to examine this subject at length would do well to consult the very valuable and learned work of Dr Prichard, on the Physical History of Man.

'The facts and observations adduced in this section, lead us manifestly to the following conclusions. First, That the differences of physical organisation, and of moral and intellectual qualities, which characterise the several races of our species, are analogous in kind and degree to those which distinguish the breeds of the domestic animals; and must, therefore, be accounted for on the same principles. Secondly, That they are first produced in both instances, as native or congenital varieties; and then transmitted to the offspring in hereditary succession. Thirdly, That of the circumstances, which favor this disposition to the production of varieties in the animal kingdom, the most powerful is the state of domestication. Fourthly, That external or adventitious causes, such as climate, situation, food, way of life, have considerable effect in altering the constitution of man and animals; but that this effect, as well as that of art or accident, is confined to the individual, not being transmitted by generation, and therefore not affecting the race. Fifthly, That the human species, therefore, like that of the cow, sheep, horse, and pig, and others, is single; and that all the differences, which it exhibits, are to be regarded merely as varieties.'

There is no subject more curious in Natural History than the instinct of animals, that faculty which enables them to provide for the continuance of their species. It teaches them the best mode of constructing their habitations, of securing them against attack, of preparing them for the reception of their offspring, and of providing food suitable for their nourishment. It differs from intelligence in not being susceptible of improvement; bees, for example, have always constructed their cells with as much ingenuity as at the present day, while man, by the exercise of his reasoning powers, has rapidly advanced in the comforts and conveniences of his habitation. It is impossible that the actions of animals, resulting from instinct, can be the effect of anything like foresight or calculation, because they are performed by every individual in precisely the same way, and it would moreover suppose a much greater degree of intelligence, than any of them possess. The view taken of this subject by Cuvier, in the following passage, has at least the merit of being novel and ingenious.

'On ne peut se faire d'idée claire de l'instinct, qu'en admettant que ces animaux ont dans leur sensorium des images ou sensations innées et constantes, qui les déterminent à agir comme les sensations ordinaires et accidentelles déterminent communément. C'est une sorte de rêve ou de vision, qui les poursuit toujours et dans tout ce qui a rapport à leur instinct; on peut les regarder comme des espèces de somnambules.'

Besides instinct, animals possess some degree of intelligence; they are capable of being taught, of acquiring respect for those placed over them, and of becoming grateful for kindness. But though much has been said to exalt the intellectual faculties of the brute creation, the least observation is sufficient to convince us, that those which they possess are of very humble and limited extent. The physical force of man is greatly inferior to that of many other animals, and if they enjoyed his mental faculties, even in a small degree, how easily might they counteract his designs, instead of being subjected to his will. Man is the only animal, who possesses to any extent the power of reasoning; he alone is capable of forming comparisons, and of arriving at conclusions from a knowledge of facts. Other animals have the organs of speech in as great perfection, but it is the want of the reasoning faculty that prevents them from constructing language.

Several other subjects have been suggested to us by the perusal of this volume, which we might notice to advantage; and we cannot conclude without expressing our thanks to Dr Ware, for restoring to us a valuable work in an improved form, and one which had become, in a great measure, obsolete and of course useless. All those, who wish to be introduced in an agreeable way to the study of Natural History, will do well to begin with the present edition of Smellie; and we cordially recommend it to the instructers of youth, as a book which combines great accuracy in every point relating to the science of which it treats, written in a pure and perspicuous style, and so arranged, without impairing the value of the work, as to exclude everything not proper to be taught.